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<p>Rupture of the stomach is a catastrophic complication which may follow either illness or operative procedure. The complication has been associated with a high mortality rate. Since it has been reported following different types of surgical procedures under general anesthesia, it behooves the oral and maxillo-facial surgeon to have a general understanding of the syndrome, its presentation and treatment. A case of spontaneous rupture of the stomach following an oral surgical procedure under general anesthesia is presented and a review of the subject accomplished.</p>		

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Spontaneous Rupture of the Stomach; Report of Case

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Rupture of the stomach is a catastrophic complication which may follow either illness or operative procedure.

The complication has been associated with a high mortality rate. Since it has been reported following different types of surgical procedures under general anesthesia, it behooves the oral and maxillo-facial surgeon to have a general understanding of the syndrome, its presentation and treatment.

A case of spontaneous rupture of the stomach following an oral surgical procedure under general anesthesia is presented and a review of the subject accomplished.

Report of Case

A 21-year-old black female was referred to the oral surgery clinic for evaluation and treatment of a mass in the hard palate. The mass was felt to represent a tumor of minor salivary gland origin and a resection was scheduled under general anesthesia.

Except for the tumor of the hard palate, the patient's admission physical examination was normal as were the admission laboratory studies and chest x-ray. The patient had no prior history of gastric disease and was considered an excellent general anesthesia risk.

The procedure was performed under general oral endotracheal anesthesia with halothane-nitrous oxide-oxygen. A McIver mouth prop was

Upon arrival in the recovery room, oxygen by nasal catheter was instituted. The patient was noted to be restless and complained of pain in her back. No coughing or vomiting occurred. Examination revealed some distention of the abdomen and a diagnosis of gastric dilatation was entertained. The nasal oxygen was discontinued and an attempt to pass a nasogastric tube was made. The tube could not be passed down the esophagus. The patient's abdomen became massively distended and she experienced dyspnea. She developed tachycardia (110) and became hypotensive (90 systolic).

Portable x-rays of the chest and abdomen (Figs 1 and 2) showed a massive pneumoperitoneum with marked displacement of the diaphragm superiorly. No subcutaneous or mediastinal emphysema was noted clinically or radiographically. The patient showed marked respiratory distress and a diagnosis of ruptured intraperitoneal viscus was made. An 18-gauge needle was inserted in the right upper quadrant with the escape of a large amount of intraperitoneal air. The patient's abdomen was decompressed with relief of respiratory distress. Blood pressure rose to 150/70. She was returned to the operating room for exploratory laparotomy.

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Under general endotracheal anesthesia, the patient's peritoneal cavity was entered through an upper midline incision and the abdomen was explored. There was an area of reddish-brown discoloration in the gastrohepatic omentum. The omentum was opened disclosing a 2½ cm perforation along the lesser curvature of the stomach just below the esophagogastric junction. The mucosa was free of abnormality by palpation and inspection. The wound was closed in two layers and a Stamm Gastrostomy was performed utilizing a #26 Foley catheter. No other intra-abdominal abnormality was noted and the abdominal incision was closed. Intraoperatively the patient was placed on parenteral antibiotics which were continued in the immediate postoperative period.

The patient's postoperative course was uncomplicated. Her gastrostomy tube was removed on the sixth postoperative day and she was discharged from the hospital on the eighth postoperative day.

LITERATURE REVIEW

Many of the earliest reported cases of gastric rupture were those of spontaneous perforations due to overeating or drinking, often following self-treatment with a sodium bicarbonate type preparation. In 1929, Glassman¹ reviewed the literature on spontaneous rupture of the stomach. He brought up the question as to whether simple over-distention of the stomach could cause rupture without the concomitant factor of functional or mechanical blockade of the normal avenues of outflow.

Acute abdominal distention was a well-recognized entity by 1949 when Morris, Ivy and Maddock² cited a number of cases and expounded on possible causative mechanisms. Some of the causes of distention theorized at that time included air swallowing and air sucking or "stomach respiration." It is noteworthy that of the cases cited, acute and enormous distention occurred

within a very short time interval, i.e., 5-15 minutes.

Maddock, Bell and Tremaine³ make a point for relaxation of the superior cardiac sphincter and a form of gastric respiration as being a cause of gastric distention. They cite a case of Graham's⁴ received on personal communication which seemed to have been caused by this phenomenon. In Graham's case, a 47-year-old woman in apparent good health was placed under general anesthesia by intravenous sodium thiopental for the removal of a premolar root fragment. After insertion of an oro-pharyngeal airway, an inspiratory hissing sound was audible to all in the operating room. Mild abdominal distention was apparent. A laparotomy was accomplished and a 4.5 centimeter rent was found in the stomach near the lesser curvature just below the gastroesophageal junction. This was closed and the patient recovered uneventfully.

In 1953, Peterson⁵ reported a case of a 23-year-old, apparently healthy woman who was placed under general anesthesia for the extraction of 23 carious and abscessed teeth. Following surgery and after the patient had been returned to her room, she began to complain of severe pain in the small of her back and down her legs. The abdomen at this time was distended and rapidly increased in distention. This patient went on to die, and autopsy revealed a four-centimeter tear in the stomach. A clinical pathological conference which was conducted on this case never considered the possibility of gastric rupture. A radiograph had not been taken.

Millar, Bruce and Paterson⁶, in 1957, reported two cases of spontaneous rupture of the stomach, one of which was probably precipitated by occlusion of the pyloric outlet and the other complicated by an air embolism which contributed to the demise of the patient. In 1959, McGreane⁷ reported a

case of pneumoperitoneum following tonsillectomy. In his case, ether was administered mixed with air by means of a nasal catheter with its tip placed at the mid-pharyngeal region. Upon completion of the operation 20 minutes later, it was noted that the patient's abdomen was markedly distended. X-rays showed a massive pneumoperitoneum which was treated immediately by paracentesis and removal of 1500 cubic centimeters of air. Another 1000 cubic centimeters of air was removed the following day and the patient was placed on intravenous fluids and antibiotics. This patient was not operated and apparently recovered without sequelae. The cause of the pneumoperitoneum was thought to be a minute rent in the gastrointestinal tract. The author stated that treatment can be conservative with paracentesis in the case of accidental gastrointestinal perforation.

A case of unexpected rupture of the stomach in a 17-year-old housewife shortly postpartum was reported by Christoph and Pinkham⁸ in 1960. They state that a functional type of acute gastric dilatation is a recognized complication of the postpartum period. They based the probable cause of this rupture on ischemic necrosis of a portion of the gastric wall secondary to prolonged dilatation. These authors agree with previously described cases⁹ that "unexpected rupture" is a more descriptive phrase in describing this phenomenon.

In 1961, Walstad and Conklin¹⁰ reported three cases of rupture of the stomach which they attributed to therapeutic oxygen administered following surgery. It is interesting to note that in all three cases, the rupture occurred along the lesser curvature and all three patients were women. In two of the cases, attempts at passing a nasogastric tube were unsuccessful.

These authors conclude that rupture cannot occur unless the normal outlets of the stomach are somehow obstructed. Also in 1961, Olsen and Foley¹¹ coined the phrase "air-suckers gastric rupture syndrome" and cite a case where they felt that air was sucked into the stomach by inspiratory effort through a relaxed superior esophageal sphincter in the absence of swallowing movements.

In 1963, Davis, Andresen, Akre and McCarthy¹² reviewed the literature on spontaneous rupture of the stomach from all causes. They reported a case of unexpected and unexplained rupture of the stomach in a 34-year-old pregnant female following removal of a ruptured appendix and subsequent stillborn delivery. They review the signs and symptoms and state that abdominal radiographs are important for diagnosis and that prompt surgical intervention is necessary.

Albo, de Lorimier and Silen¹³, in 1963, report a case of a 62-year-old male who developed gastric rupture following a grand mal seizure. They show a chart of 43 previously reported cases of spontaneous gastric rupture as far back as 1842. Only 16 of these cases appear to fall into the category of unexpected rupture. Thirteen of the sixteen were in females. Of the 43 cases, the site of rupture in 30 was along the lesser curvature of the stomach. Overall mortality was 85 percent.

In 1969, a case of spontaneous rupture of the stomach following inguinal herniorrhaphy was reported by Harper and Roper¹⁴. This case, in many respects, is very similar to ours. Early decompression of the abdomen by means of a large bore needle is cited as an important step for relief of symptoms and initial stabilization of the patient prior to surgical exploration.

In a case reported by Jefferiss¹⁵ in 1972, gastric perforation followed

retching in a patient with long standing pyloric stenosis. Henry, et al¹⁶, in 1976, cited eleven cases from the literature from 1961 through 1974 which implicated oxygen therapy in the adult as causative of gastric rupture and showed that half of the cases occurred during routine awakening from anesthesia. He stressed early surgical intervention as a life saving measure.

Gastric rupture following chronic distention is often associated with necrosis of the gastric wall as pointed out by Matikainen¹⁷ in 1979. Spontaneous gastric rupture in the newborn appears to be more common than in the adult.¹⁸

DISCUSSION

The cause of this complication was never definitely determined. The patient was intubated with a cuffed tube but was given oxygen by face mask on the operating table following extubation for at least 2 minutes prior to being transferred to the bed. The period of time from the arrival in the recovery room until discovery of the distended abdomen was extremely short and followed placement of the nasal oxygen catheter by no more than 30 seconds. The tip of the catheter was placed rather superficially, and presumably, an excess oxygen flow would escape outwardly through the external naris rather than flow into the stomach even in the presence of a relaxed esophagus and lower esophageal sphincter. Possibilities such as air sucking or air swallowing cannot be ruled out. A nasogastric tube was not used intra-operatively. Why multiple attempts at passing a nasogastric tube postoperatively were unsuccessful may well be explained by a stomach and thoracic esophagus compressed by the

enclosed intraperitoneal air. Coughing, retching and vomiting as contributing factors can be ruled out since none of these were present. The pathology report on the tumor of the palate confirmed our diagnosis of benign mixed tumor of salivary gland origin.

SUMMARY

A rare complication of surgery under general anesthesia has been presented. Time from onset of the complication to laparotomy was under 3 hours. Delays in diagnosis and prompt therapy may have led to further complications such as air embolism, subcutaneous and mediastinal emphysema, respiratory collapse and shock which may well have resulted in loss of the patient.

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The opinions or assertions contained herein are the private views of the authors and are not to be construed as reflecting the views of the Department of the Army or the Department of Defense.



FIGURE 1.



figure 2.

LEGENDS

Figure 1. Portable chest x-ray showing marked displacement of the diaphragm superiorly.

Figure 2. Upright abdominal x-ray showing marked distention with air.

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